

REMARKS

Rejections under 35 U.S.C. §102(b)

The Office Action rejects claims 1 and 3-10 as being anticipated by U.S. Patent No. 4,933.309 to Luthra. The Office Action states that Luthra discloses:

- a ceramic composite which is taught to contain ceramic fibres of alumina as well as a ceramic powder of alumina with a particle size of 1-6 microns;
- a composite structure in a fired state;
- use of tape-casting to produce the ceramic piece with the binder and sintering aid evaporated off, with a fired porosity of 60% or less; and
- use of the article in high temperature environments.

Regarding the ability of Luthra's article to have the same characteristics as the claimed article (ceramic fibres remaining flexible at operating temperatures and ceramic fibres sintering at operational temperature), these characteristics are considered to be met by Luthra. They are met since Luthra teaches the use of the same materials (alumina fibre and powders) and the same process to manufacture (tape-casting) with the same size particles with porosity in the range of the applicant. By this disclosure, the features of flexible ceramic fibres at operating temperatures and fibres resisting sintering at operating temperatures is considered to be met by Luthra.

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Regarding claims 4-6, while Luthra does not specifically mention a pre-fired porosity, these claims are considered to be met by Luthra which teaches the use of the same materials (alumina fibre and powders) and the same process to manufacture (tape-casting) with the same size particles with porosity in the range of the applicant. Since claim 1 relates to a seal in a "fired state," the limitations of claims 4 and 5 are merely to an intermediate phase of the final "fired" product. Thus, these limitations are not of the final product (product of claim 1) and are not given patentable weight over the prior art.

Applicants respectfully traverse these rejections. The "coated fibrous material" described in Luthra does not equate to the "ceramic fibres" recited in Applicants' claim 1. Luthra's fibrous material comprises a ceramic oxide coated with a noble metal selected from platinum, iridium, rhodium, ruthenium, or any combination thereof. It is emphasized throughout Luthra that "the metallic coating should leave none, or no significant portion, of the fibrous material exposed" (col. 2,

lines 17-19; col. 2, 54-56; col. 3, lines 37-39) in order to prevent clamping, bonding, or any chemical reaction between the fibre and the ceramic matrix (col. 1, lines 34-38). Luthra teaches use of "chemically compatible" materials, meaning that "no significant chemical reaction occurs between the fibre and the matrix" (col. 1, lines 39-41). However, non-compatible oxides may be used since the metallic coating prevents chemical reaction between the fibre and the matrix (col. 1, lines 41-46):

The coating of noble metal bars contact, or bars significant contact, between the matrix and fibrous material. In the present composite, there is no reaction product, or no significant amount of reaction formed directly between the ceramic matrix and the fibrous material. Preferably, there is no reaction product formed directly between the ceramic matrix and the fibrous material which is detectable by scanning electron microscopy. Also, there is no significant reaction between the metallic coating and the matrix or fibrous material. Generally none of the coated fibrous material in the composite, or no significant portion thereof, is exposed (col. 5, lines 15-17, emphasis added).

In each of the described production methods, coated fibrous material is contacted with matrix-forming ceramic oxide powder to form a combination, mixture or compact to yield the final composite. The final composite comprises ceramic matrix and metallic coated fibrous material, as confirmed by scanning electron microscopy (col. 5, lines 47-52; see also Examples 1-4). Further, the final composite incorporating metallic coated fibrous material was found to have a toughness significantly higher than that of a composite having uncoated fibrous material due to optimization of the interfacial shear stress between the coated fibrous material and the ceramic matrix (col. 5, lines 53-57).

In contrast, Applicants' claimed seal comprises ceramic fibres and ceramic powder. Since there is no coating on the ceramic fibres, there is direct contact between the ceramic fibres and the ceramic powder. The ceramic fibres form the skeleton of the seal to provide strength and flexibility, and the ceramic powder is interspersed within the ceramic fibre matrix to provide optimal sealing performance. The as-filed specification teaches away from metal within the seal (i.e., metal fibres or metal particles) due to problems for example, with electrical conductivity and instability at fuel cell operating temperatures (see paragraph [0027]). Anticipation requires the disclosure in a single prior art reference of each element of the claim under consideration (*Verdegaal Bros. v. Union Oil Co. of*

California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)). Applicants thus submit that the claimed seal which comprises ceramic fibres and ceramic powder in direct contact is not the same as the final composite of Luthra which incorporates metallic coated fibrous material to prevent direct contact between the fibrous material and ceramic matrix. Therefore, claim 1 cannot be anticipated by the Luthra reference. Reconsideration and withdrawal of this rejection of claim 1 and dependent claims 3-10 are thus respectfully requested.

CONCLUSION

In view of the foregoing remarks and amendments, it is respectfully submitted that this application is in condition for allowance and allowance thereof is respectfully requested.

Respectfully submitted,

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